



central core disease

Central core disease is a disorder that affects muscles used for movement (skeletal muscles). This condition causes muscle weakness that ranges from almost unnoticeable to very severe.

Most people with central core disease experience persistent, mild muscle weakness that does not worsen with time. This weakness affects the muscles near the center of the body (proximal muscles), particularly muscles in the upper legs and hips. Muscle weakness causes affected infants to appear "floppy" and can delay the development of motor skills such as sitting, standing, and walking. In severe cases, affected infants experience profoundly weak muscle tone (hypotonia) and serious or life-threatening breathing problems. Central core disease is also associated with skeletal abnormalities such as abnormal curvature of the spine (scoliosis), hip dislocation, and joint deformities called contractures that restrict the movement of certain joints.

Many people with central core disease also have an increased risk of developing a severe reaction to certain drugs used during surgery and other invasive procedures. This reaction is called malignant hyperthermia. Malignant hyperthermia occurs in response to some anesthetic gases, which are used to block the sensation of pain, and with a particular type of muscle relaxant. If given these drugs, people at risk for malignant hyperthermia may experience muscle rigidity, breakdown of muscle fibers (rhabdomyolysis), a high fever, increased acid levels in the blood and other tissues (acidosis), and a rapid heart rate. The complications of malignant hyperthermia can be life-threatening unless they are treated promptly.

Central core disease gets its name from disorganized areas called cores, which are found in the center of muscle fibers in many affected individuals. These abnormal regions can only be seen under a microscope. Although the presence of cores can help doctors diagnose central core disease, it is unclear how they are related to muscle weakness and the other features of this condition.

Frequency

Central core disease is probably an uncommon condition, although its incidence is unknown.

Genetic Changes

Mutations in the *RYR1* gene cause central core disease.

The *RYR1* gene provides instructions for making a protein called ryanodine receptor 1. This protein plays an essential role in skeletal muscles. For the body to move

normally, these muscles must tense (contract) and relax in a coordinated way. Muscle contractions are triggered by the flow of charged atoms (ions) into muscle cells. The ryanodine receptor 1 protein forms a channel that releases calcium ions stored within muscle cells. The resulting increase in calcium ion concentration inside muscle cells stimulates muscle fibers to contract, allowing the body to move.

Mutations in the *RYR1* gene change the structure of ryanodine receptor 1, allowing calcium ions to "leak" through the abnormal channel or impairing the channel's ability to release stored calcium ions at the correct time. This disruption in calcium ion transport prevents muscles from contracting normally, leading to the muscle weakness characteristic of central core disease.

Inheritance Pattern

Central core disease is most often inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder. In some cases, an affected person inherits the mutation from one affected parent. Other cases may result from new mutations in the gene. These cases occur in people with no history of the disorder in their family.

Less commonly, central core disease is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. Most often, the parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but typically do not show signs and symptoms of the condition. People who carry one mutated copy of the *RYR1* gene, however, may be at increased risk for malignant hyperthermia.

Other Names for This Condition

- CCD
- CCO
- Central Core Myopathy
- Myopathy, Central Core
- Shy-Magee Syndrome

Diagnosis & Management

Genetic Testing

- Genetic Testing Registry: Central core disease
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C0751951/>

Other Diagnosis and Management Resources

- GeneReview: Central Core Disease
<https://www.ncbi.nlm.nih.gov/books/NBK1391>
- MedlinePlus Encyclopedia: Hypotonia
<https://medlineplus.gov/ency/article/003298.htm>
- MedlinePlus Encyclopedia: Malignant Hyperthermia
<https://medlineplus.gov/ency/article/001315.htm>

General Information from MedlinePlus

- Diagnostic Tests
<https://medlineplus.gov/diagnostictests.html>
- Drug Therapy
<https://medlineplus.gov/drugtherapy.html>
- Genetic Counseling
<https://medlineplus.gov/geneticcounseling.html>
- Palliative Care
<https://medlineplus.gov/palliativecare.html>
- Surgery and Rehabilitation
<https://medlineplus.gov/surgeryandrehabilitation.html>

Additional Information & Resources

MedlinePlus

- Encyclopedia: Hypotonia
<https://medlineplus.gov/ency/article/003298.htm>
- Encyclopedia: Malignant Hyperthermia
<https://medlineplus.gov/ency/article/001315.htm>
- Health Topic: Muscle Disorders
<https://medlineplus.gov/muscle disorders.html>

Genetic and Rare Diseases Information Center

- Central core disease
<https://rarediseases.info.nih.gov/diseases/6014/central-core-disease>

Additional NIH Resources

- National Institute of Neurological Disorders and Stroke: Congenital Myopathy Information Page
<https://www.ninds.nih.gov/Disorders/All-Disorders/Congenital-Myopathy-Information-Page>

Educational Resources

- Disease InfoSearch: Central Core Disease
<http://www.diseaseinfosearch.org/Central+Core+Disease/1190>
- MalaCards: central core disease
http://www.malacards.org/card/central_core_disease
- Orphanet: Central core disease
http://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=597

Patient Support and Advocacy Resources

- Malignant Hyperthermia Association of the United States
<http://www.mhaus.org/>
- Muscular Dystrophy Association
<https://www.mda.org/disease/inherited-and-endocrine-myopathies>
- Muscular Dystrophy UK: Congenital Myopathies
<http://www.musculardystrophyuk.org/about-muscle-wasting-conditions/congenital-myopathies/>
- National Organization for Rare Disorders (NORD)
<https://rarediseases.org/rare-diseases/central-core-disease/>
- Resource list from the University of Kansas Medical Center
<http://www.kumc.edu/gec/support/muscular.html>

GeneReviews

- Central Core Disease
<https://www.ncbi.nlm.nih.gov/books/NBK1391>

ClinicalTrials.gov

- ClinicalTrials.gov
<https://clinicaltrials.gov/ct2/results?cond=%22central+core+disease%22+OR+%22Myopathies%2C+Structural%2C+Congenital%22+OR+%22Myopathy%2C+Central+Core%22>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28Myopathy,+Central+Core%5BMAJR%5D%29+AND+%28%28central+core+disease%5BTIAB%5D%29+OR+%28central+core+myopathy%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D>

OMIM

- CENTRAL CORE DISEASE OF MUSCLE
<http://omim.org/entry/117000>

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